

Infection control guideline for the management of Ebola virus disease in Queensland

September 2015

Interim infection control guidelines for the management of Ebola virus disease in Queensland

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An electronic version of this document is available at www.health.qld.gov.au/ebola

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1. Aim

These guidelines aim to prevent infection of healthcare workers caring for persons with Ebola virus disease (EVD) through the implementation of appropriate infection control measures. They provide recommendations for best practice of managing patients with suspected or known EVD in a hospital setting.

2. Scope

These guidelines should be read in conjunction with the *Queensland Ebola virus disease management plan* and the *Interim guidelines for Ebola virus disease voluntary home restriction* available at www.health.qld.gov.au/ebola.

These guidelines are applicable to all Queensland Health staff caring for a suspected, probable or confirmed case of EVD. They are also applicable to healthcare workers caring for an EVD patient in a private hospital setting.

They outline only those measures that are specific to EVD. Additional infection prevention and control measures might be warranted, if an EVD patient has other conditions or illnesses for which other measures are indicated, e.g. tuberculosis, multi-drug resistant organisms etc.

They also outline minimum recommendations to protect healthcare workers from infection and cover the following areas:

- case definition
- patient placement
- personal protective equipment (PPE)
- patient care equipment
- patient care considerations
- aerosol generating procedures
- hand hygiene
- environmental cleaning and disinfection
- safe injection practices
- duration of infection control precautions
- monitoring and management of potentially exposed personnel
- monitoring, management and training of visitors.

3. Key principles

The key principles of these guidelines are:

- Early recognition of EVD is critical.
- Prior to working with EVD, **all** healthcare workers involved in the care of an EVD patient must receive **repeated training** and have **demonstrated competence** in performing all EVD-related infection control practices and procedures, specifically in donning/removing PPE.

- Healthcare workers caring for EVD patients should have no skin exposed.
- Contact with an EVD case should be minimised to essential staff only.
- A log of all staff having contact with the EVD patient must be maintained.
- The overall safe care of EVD patients in a facility must be overseen by an on-site manager at all times, and each step of every PPE donning/removing procedure must be supervised by a **trained observer** to ensure proper completion of established PPE protocols.

4. Background

EVD is primarily spread through direct contact between infected blood or other body fluids and non-intact skin or mucous membranes of the eyes, nose or mouth.¹

Transmission most commonly occurs following direct contact with an infectious person, but transmission via contact with contaminated fomites or by needlestick injury can occur.¹

Standard and transmission based precautions (contact and airborne) with the addition of enhanced PPE are recommended for management of hospitalised patients with known or suspected EVD.

Enhanced PPE, including enhanced respiratory protection (N95/P2 respirator), double gloving and no skin exposure, is recommended in the care of an EVD case. These enhancements are designed to protect the healthcare worker in case of contact with secretions such as those generated by aerosol generating procedures, patient generated aerosols during vomiting and diarrhoea, and aerosols due to toilet flushing. They are also designed to protect the healthcare worker against the potential for contamination through non intact skin or contamination of exposed skin and subsequent transfer to mucous membranes. Using two pairs of gloves provides an extra layer of safety during direct patient care and during the PPE removal process.

Transmission of Ebola virus is not known to occur prior to the onset of symptoms of EVD.³ The risk of transmission is low at the onset of symptoms and increases as symptoms worsen and more bodily fluids are produced. For example, a patient with profuse vomiting and diarrhoea is a greater transmission risk than a patient with a fever only. As the course of EVD progresses, the viral load rises to very high levels and deceased bodies of patients infected with EVD may pose a significant transmission risk.² Participating in traditional burial ceremonies in affected areas of Africa is a known high-risk activity for acquiring infection.²

It is possible that virus could remain present in all bodily fluids for an unknown period of time. Ebola virus has been found in the semen of some men who have recovered from Ebola infection. It is therefore possible that Ebola virus could be transmitted through sex. Until more information is known, contact with semen from male survivors should be avoided and male survivors should be advised that if they have sex (oral, vaginal, or anal sex), a condom should be used correctly and consistently every time.¹²

The risk of transmission in healthcare settings can be reduced by stringent adherence to infection prevention and control precautions and environmental cleaning.

4.1 Enhanced surveillance

Early recognition is critical for preventing transmission of Ebola virus. Healthcare workers must be able to recognise a possible case of EVD and be ready to employ practical infection prevention and control precautions, including:

- isolation of suspected and confirmed EVD patients
- wearing of protective clothing (such as P2/N95 respirator, two pairs of gloves, gowns and face shield) when in the same room as the case
- enhanced hand hygiene
- minimising the number of healthcare workers having contact with the suspected/confirmed case
- allocation of dedicated equipment for patient use.

Staff, especially those responsible for triaging and admitting patients into facilities, should be alert and evaluate any patients that could have EVD.

Two Queensland hospitals—Royal Brisbane and Women’s Hospital (RBWH) and the Lady Cilento Children’s Hospital (LCCH)—are currently EVD designated treatment hospitals and suspected, probable and confirmed EVD cases will be managed in these facilities. As circumstances may arise that prevent a suspected, probable or confirmed EVD case being managed in any of these hospitals, all hospitals should be prepared to manage unexpected presentations to emergency departments.

All emergency departments should be actively screening people who present to determine any recent travel to countries with intense and widespread transmission of Ebola virus in the last 21 days.³

If a symptomatic person advises that they have resided in or travelled to an area with active Ebola virus transmission within the last 21 days, they should immediately be placed in a single room in accordance with the patient placement plan of this guideline while further information is gathered.

Staff caring for a suspected, probable or confirmed EVD case should be limited to those required to undertake an immediate assessment and provide any urgent medical care.² Full EVD recommended PPE should be worn by staff attending the patient until a diagnosis of EVD is negative.

4.2 Notification

If on assessment the patient is suspected to have EVD, the facility must immediately notify their local public health physician (PHP)³ so that they can assist with risk assessment and coordination of further care.¹⁵

If the hospital is not a designated EVD hospital, a teleconference should be held immediately to determine if it is safe to retrieve the patient to the designated hospital for testing.

The following people should be included in the teleconference:

- PHP
- hospital infectious diseases physician
- treating physician

- Senior Director, Communicable Diseases Unit
- Chief Health Officer (if available)
- director of retrieval services
- Queensland Ambulance Service (QAS).

Where clinically appropriate and safe to do so, suspected, probable or confirmed EVD cases within two hours of an EVD designated hospital will be transported by road ambulance. In special situations, ambulance services may be able to transport cases by road over a distance of up to four hours.

Where it is clinically and logistically safe to do so, air retrieval to a designated hospital will be arranged for persons with suspected, probable or confirmed EVD that are more than two hours travel by road from Brisbane.

4.3 Case definition

Patients presenting with the following history should be considered for the possibility of EVD:

- sudden onset fever
- weakness
- myalgia
- headache
- sore throat.

Followed by one or more of the following symptoms:

- vomiting
- diarrhoea
- rash
- sometimes haemorrhagic manifestations.

AND

Epidemiologic risk factors within the 21 days before onset of symptoms such as:

- contact with blood, other body fluids or human remains of a patient known to have or suspected to have EVD
- residence in, or travel to, an area where Ebola virus transmission is active*
- direct handling of bats, rodents or primates from disease-endemic areas.

*Outbreak affected countries with intense transmission include Guinea, Liberia and Sierra Leone. For current situation reports, visit the [World Health Organization website](#).

4.4 Incubation period

The incubation period is 2–21 days.

5. Patient placement

All patients meeting the case definition of suspected, probable or confirmed EVD should be managed in a single room under EVD specific precautions. The following patient placement options should be applied in order according to facility resources.

Note: It is imperative that the overall safe care of EVD cases in a facility is overseen by an on-site manager at all times. In addition, each step of every PPE donning/removing procedure must be supervised by a trained observer to ensure proper completion of established PPE protocols.²

5.1 Option one

Single room with ensuite facilities, negative pressure air handling and dedicated anteroom

- Patients should be placed in a single room containing a private bathroom and an anteroom³ with a negative pressure air handling system, and managed under standard and transmission based contact and airborne precautions with the addition of enhanced PPE.
- Donning and removing of PPE is to be undertaken in the anteroom with a clear separation between clean and potentially contaminated areas.¹

Please refer to the Section 6. Personal protective equipment for more information.

5.2 Option two

Single room with ensuite facilities without negative pressure air handling

- When option one is not available, patients should be placed in a single room containing a private bathroom with the door closed^{1, 3, 4} and be managed under standard and transmission based contact and airborne precautions.
- An adjacent room or area immediately outside the room should be cordoned off to create designated areas for donning and removing PPE.¹
- Clear separation between clean and potentially contaminated areas must be identified within the area designated for donning and removing PPE.¹

Please refer to Section 6. Personal protective equipment for more information.

5.3 Option three

Single room without ensuite facilities and without negative pressure

- When options one and two are not available, patients should be placed in a single room with the door closed.
- In addition to the recommendations outlined within Option two, a commode will need to be designated to the patient for the duration of care and should remain in the patient's room.²

Note: When ensuite facilities are not available the use of 'single patient use' disposable bedpans is preferred over reusable bedpans and commodes.²

Please refer to the Section 11.5 Sewage for more information.

5.4 General placement considerations

Regardless of the patient placement option, it is essential that the number of healthcare workers who come into contact with the suspected, probable or confirmed EVD case be limited. Non-essential personnel and visitors should be restricted from the patient care area.^{1,3} Any essential visitors must maintain a non-contact distance of more than one metre.¹ Direct contact by visitors with the patient should only be allowed under exceptional circumstances (e.g. parent supporting a child). Visitors having direct contact with the EVD patient must wear recommended PPE and be trained in its application and removal, and observed when putting on PPE.

When considering patient placement options, facilities should ensure that space and layout allow for a clear separation between clean and potentially contaminated areas. It is critical that physical barriers (e.g. plastic enclosures) along with visible signage (e.g. floor marking) be used where necessary to separate distinct areas and ensure a one-way flow of care moving from clean areas (e.g. area where PPE is donned and unused equipment is stored) to the patient room and to the PPE removal area.¹ Facilities should designate the following areas with appropriate signage.¹

5.4.1 PPE storage and donning area

This is an area outside the EVD patient room (e.g. a nearby vacant patient room or a marked area in the hallway outside the patient room) where clean PPE is stored and where healthcare workers can put on PPE before entering the patient's room. Potentially contaminated equipment, used PPE or waste removed from the patient's room should not be stored in this area. If waste must pass through this area, it must be properly contained.

5.4.2 Patient room

This is a single patient room. The door should be kept closed. Any item or healthcare worker exiting this room should be considered potentially contaminated.

5.4.3 PPE removal area

This is an area in proximity to the patient's room (e.g. anteroom or adjacent vacant patient room that is separate from the clean area) where healthcare workers leaving the patient's room can remove and discard their PPE. Alternatively, some steps of the PPE removal process may be performed in a clearly designated area of the patient's room near the door. This can only be undertaken if the:

- removal of PPE can be seen and supervised by a trained observer (e.g. through a window where the healthcare worker removing PPE can still hear the instructions of the trained observer)
- area within the patient room does not put the healthcare worker at risk of contamination from contaminated flooring or other environmental surfaces (e.g. if the patient has had projectile vomiting or diarrhoea that may have caused potential contamination of the floor and environmental surfaces near the door).

- This clearly designated area within the patient room should not be used for any other purpose. Gloves should be stocked in a clean section of the PPE removal area which is accessible to the healthcare worker while removing PPE.

In the PPE removal area, facilities must provide supplies for the disinfection of PPE, including Therapeutic Goods Administration (TGA) registered disinfectant wipes for the removal of gross contaminants and alcohol-based hand rub (ABHR) for performing hand hygiene. The area must allow for adequate space to remove PPE, including a place for sitting that can be easily cleaned and disinfected, and where the healthcare workers can remove boot covers.

Leak-proof clinical waste containers for discarding used PPE must be available within the PPE removal area. To avoid environmental contamination, frequent environmental cleaning and disinfection of the floor, all surfaces (with particular attention to high-touch surfaces), equipment and other items must be undertaken within this area.

If a facility must use the hallway outside the patient room as the PPE removal area, facilities should erect physical barriers to close the hallway, thereby creating an anteroom. In doing so, the facility should make sure that this hallway space complies with fire codes. Access to this hallway should be restricted to essential personnel who are properly trained on recommended infection prevention practices for the care of patients with EVD.⁵

Facilities should consider making showers available for use by healthcare workers after removing PPE.

Other points for consideration relevant to patient placement are:

- Patients should not be placed in rooms that have carpet, and all upholstered furniture and decorative curtains should be removed from patient rooms before use.⁶
- The placement of patient notes and bedside charts should be considered outside the room.
- Doors should be kept closed at all times.
- Appropriate transmission-based precaution signage should be displayed to identify the isolation room and the necessary precautions to be adopted.³ Wherever possible, direct contact by visitors should be avoided.³ In the event that this is not possible, visitors must be trained in and adhere to recommended PPE guidelines and a visitor's log should be maintained.

Note: Visitors who have had contact with a known or suspected EVD patient before or during hospitalisation are a possible source of exposure for other patients, visitors and staff. Therefore, facilities must have a process for screening visitors for EVD before entering or upon arrival at the hospital (see Section 17. Monitoring, management and training of visitors).

6. Personal protective equipment

All healthcare workers involved in the care of patients with suspected, probable and confirmed EVD should be trained in the use of Personal Protective Equipment (PPE). Guidance on this can be found in the Interim PPE guidelines for managing Ebola Virus

disease patients. Available from: <https://www.health.qld.gov.au/publications/clinical-practice/guidelines-procedures/diseases-infection/ppe-guideline.pdf>

7. Patient care equipment

Patient care equipment (e.g. electronic thermometers, sphygmomanometers, glucometers, pat slides etc.) may be a source of transmission when shared between patients. Therefore, to reduce the risk of transmission equipment should be disposable (preferable where possible), or at a minimum, dedicated to that patient for exclusive use for the duration of their hospitalisation.^{2,4,6}

As a general rule, facilities should limit personal items of the patient entering the room, especially if the items cannot be readily cleaned or disinfected (e.g. laptop computers, children's toys etc.).

All items leaving the patient room should be moved to the PPE removal area and placed in a space designated for the decontamination of equipment.

Refer to Section 11. Environmental cleaning and disinfection for details on the cleaning of these items.

8. Patient care considerations

8.1 Staff allocation

In order to minimise the risk of transmission of EVD, facilities should consider the following when allocating staff to care for patients with suspected, probable or confirmed EVD:

- only allocate staff who have undergone appropriate training in the use of PPE, environmental cleaning, and disinfection of equipment. This training should include the relevant categories of HCWs¹ (including cleaning staff)
- staff rosters should include adequate numbers of staff to avoid staff fatigue. HCWs can tolerate enhanced PPE for only short periods, depending on ambient temperature and intensity of activity, before developing heat exhaustion and dehydration¹⁴
- facilities should keep a log of all persons who care for or enter the room of EVD patients.

Certain health conditions may preclude staff from providing direct care for EVD patients and should be taken into consideration when allocating staff. These may include:

- medical conditions that could affect their ability to exit the room quickly and safely, or may require another staff member to enter the room to provide urgent medical assistance (e.g. seizure disorder, hypoglycaemia)¹⁴
- inability to safely put on, use, or remove recommended PPE (e.g. claustrophobia, significant anxiety, body morphology, mobility issues)¹⁴
- have non-intact skin (from dermatitis, abrasions, wounds, etc)¹⁴
- have underlying conditions that affect immune competence¹⁴

- pregnancy (no evidence currently exists to suggest that pregnant women are more susceptible to infection from Ebola than the general population.¹⁵ Limited evidence does suggest that pregnant women are likely to be at increased risk of severe illness and death when infected with Ebola virus.¹⁵ Pregnant women with EVD also appear to be at an increased risk of foetal loss and pregnancy-associated haemorrhage).¹⁵

8.2 Patient movement

Wherever possible, movement of an EVD patient should be restricted.^{4,5,7} Restricting the movement of patients with suspected, probable or confirmed EVD reduces the risk of transmission.

A transfer of patients should only occur for essential, life saving tests. If a transfer outside the single room is necessary, placing a correctly fitting surgical mask on the patient while they are being transferred will reduce the risk of cross-transmission.⁶

Contaminated PPE should be removed and disposed of, and hand hygiene should be performed before the patient is moved.⁶ Clean PPE should be put on before moving the patient.⁶

8.3 Food services

Non-essential staff should be restricted from entering the EVD patient care area. Food services staff should deliver all food and beverages to the designated clean area. Food and beverages should then be delivered into the patient room by staff directly caring for the patient.

Water should be supplied to the patient in disposable bottles with disposable cups.

Disposable crockery and cutlery should be used where possible and placed into clinical waste in the patient room after use.

If reusable crockery and cutlery are to be used, the following should be considered:

- Saliva may carry some risk of transmission; however, studies examining this were extremely limited in sample size and the science is inconclusive.⁴
- The risk of transmission is reduced by appropriate cleaning and disinfection procedures. Used crockery and cutlery should be moved to the designated PPE removal area and placed in a secure container.
- The exterior of the container should be wiped with a detergent and 1000 ppm sodium hypochlorite solution and transported directly to the dishwashing facility.
- Staff placing items into the dishwasher should wear gloves and perform hand hygiene immediately after loading the dishwasher and handling the items. The machine should be commenced immediately and run as an individual load on a dedicated dishwashing cycle.
- Once the crockery and cutlery have been placed in the dishwasher, the container must be discarded into a dedicated clinical waste receptacle.
- The dishwasher temperature must be recorded twice a day and records kept. The dishwasher temperature must reach over 75°C.

- The person responsible for loading the dishwasher will require training in the infection prevention principles of this process.

9. Aerosol generating procedures

Whenever possible, aerosol generating procedures (AGP) should be avoided when caring for EVD patients.

If an AGP is essential, the following steps should be undertaken:

- PPE should be worn as recommended and all exposed skin should be covered.
- Visitors should not be present during an AGP.
- The number of healthcare workers present during the procedure should be limited to those essential for patient care and support.
- The procedure should be conducted in a private room with a negative pressure air handling system. The doors should be kept closed during the procedure, and entry and exit should be minimised for a short period after the procedure to allow for air change.
- Environmental surface cleaning should be conducted following AGP.

Examples of AGPs include but are not limited to:

- bilevel positive airway pressure (BiPAP)
- bronchoscopy
- sputum induction
- intubation and extubation
- open suctioning of airways.

Note: Patient generated aerosols can also occur during vomiting and diarrhoea, especially if projectile or explosive. Cleaning activities, e.g. flushing toilets and certain environmental cleaning practices, can also generate aerosols.

10. Hand hygiene

Staff should perform hand hygiene frequently, including before and after all patient contact, contact with potentially infectious material, and before putting on and after removing PPE, including gloves.⁵

Staff should note that in normal circumstances it is not acceptable to use ABHR to decontaminate gloves. However, staff should continue to perform hand hygiene in line with the “five moments for hand hygiene”, and rather than removing their gloves and performing hand hygiene they should use ABHR on their gloves.

Healthcare workers should consider the inner pair of gloves to be their ‘second skin’ and the outer set of gloves as their ‘working gloves’. Adopting this mindset helps the healthcare worker differentiate between the special requirements essential for EVD management (i.e. applying ABHR to gloved hands) and normal practice where this is discouraged.

When an aseptic technique is required, gloves should be disinfected using ABHR and then sterile gloves should be donned over the top.

If gloves become soiled with blood or body fluids, healthcare workers should immediately perform hand hygiene using ABHR. Under the direction of the trained observer, healthcare workers should inspect integrity of gloves, then proceed to remove and replace outer gloves before continuing patient care activities.

11. Environmental cleaning and disinfection

Disinfection and environmental cleaning is a key component to control EVD. The exact role of the environment in transmission has not been established yet;⁵ however, given the low infectious dose required for infection and the severity of the disease, high levels of precaution are warranted to reduce the potential risks posed by contaminated surfaces in the patient care environment.

Environmental cleaning and disinfection of the patient care area should be performed by environmental services staff who have:

- received repeated training and instructions on the precise application and removal of designated PPE
- demonstrated competency in performing all EVD related infection control practices and procedures, specifically in donning/removing recommended PPE.

A log must be maintained of all staff entering the patient care environment.

Recommended PPE must be worn for all environmental cleaning duties, including during the discharge and terminal clean of the patient care environment.

11.1 Routine cleaning

Ebola viruses are readily inactivated by low-level disinfectants. Daily cleaning tasks of the patient care environment should be undertaken as per usual practice using an appropriate disinfectant solution.

The preferred disinfectant solution is sodium hypochlorite made up to 1000 parts per million (ppm) available chlorine for routine environmental cleaning and 5000 ppm for spills (check the manufacturer's instructions).

Minimum frequencies for routine cleaning are outlined in Queensland Health's guideline on [Environmental Cleaning Risk Levels, Frequencies and Standards](#) which is available on Queensland Health's intranet site only.

The preferred routine cleaning process should involve either:

- a physical clean using combined surfactant and 1000 ppm available chlorine solution (2-in-1 clean) made up daily from a concentrated solution³
- a physical clean using detergent followed by a clean with 1000 ppm available chlorine solution (2-step clean).^{2,3}

A large body fluid spill should be cleaned with sodium hypochlorite made up to 5000 ppm available chlorine.

11.2 Final disinfectant clean

A final disinfectant clean refers to the final clean of an isolation room once the patient has been discharged.

The final clean of an EVD patient's room and disinfection of any reusable patient care equipment must not commence until the patient has left the area. Staff undertaking cleaning must wear recommended PPE at all times.

The preferred cleaning process is the same as that for routine cleaning.

Where negative pressure air handling systems are being used, negative pressure must be maintained.

Where negative pressure is not available, the door should remain closed at all times.

Surfaces should be allowed to air dry.

Any item that cannot be cleaned and disinfected with a TGA registered disinfectant wipe must be discarded and treated as clinical waste.

11.3 General cleaning considerations

Cleaning and disinfectant solutions should be freshly prepared every day and unused solution is to be discarded after 24 hours.

Floors and horizontal work surfaces are to be cleaned at least once a day. Surfaces should be allowed to dry before using them again.

High-touch surfaces, such as bedrails, trolleys, bedside commodes, doorknobs, light switches, tap handles and ensuite facilities, should be cleaned daily as a minimum.²

Any visibly contaminated equipment must be immediately disinfected using combined surfactant and 1000 ppm available chlorine solution.

All items leaving the patient room should be moved to the PPE removal area and placed in a space designated for the decontamination of equipment.

All reusable equipment should be cleaned and disinfected by either:

- a physical clean using a combined surfactant and 1000 ppm available chlorine solution (2-in-1 clean)
- a physical clean using detergent followed by a chemical disinfectant (2-step clean).³

All reusable equipment should be allowed to air dry.

After initial cleaning and disinfection, all items that meet [Spaulding's semi-critical/critical classification](#) should undergo a routine disinfection and sterilisation reprocessing. This reprocessing is sufficient, no additional disinfection or sterilisation cycle is required.³

All cleaning equipment, including buckets and cloths, should be disposed of into the clinical waste after cleaning. A supply of cheaper buckets for washing floors, that are able to be disposed of after each use, is recommended.

Only mattresses and pillows with a plastic or other fluid impermeable covering are to be used.

Items stained or containing body fluids are treated as clinical waste and should be double bagged as waste when leaving the room. Waste must be stored securely prior to collection.

Refer to the Section 11.6 Waste management for further information.

11.4 Management of blood and body fluid spills

When managing a blood or body fluid spill that may be contaminated with Ebola virus, staff should wear PPE as described previously in this guideline.²

A blood or body fluid spill should be managed through the following steps:

1. If the spill has occurred in an area the public can access, the area needs to be safely and immediately isolated by appropriate personnel and signed accordingly.
2. The spill needs to be covered with an absorbent material (if a spill kit is not available, paper towel could be used). A solution containing 5000 ppm available chlorine should be allowed to soak into the spill for at least 30 minutes; this will assist in deactivating any virus or other infectious agents that may be present.³
3. The bulk of spill matter should then be removed.
4. The absorbent material/paper towels should be discarded into the clinical waste.
5. Following the removal of the initial material, the area of contamination should again be liberally covered with a 5000 ppm sodium hypochlorite solution.
6. The site should then be cleaned and disinfected again, firstly with a neutral detergent solution followed by a solution containing 5000 ppm available chlorine.
7. Tools, such as tongs from a spill kit, should be used as much as possible rather than cleaning and disinfecting directly with gloved hands.
8. In order to avoid transfer of contaminants, cleaning and disinfection should be carried out from clean to dirty areas.
9. To prevent the potential for aerosolising the virus, cleaning techniques that may result in the generation of bio-aerosols (e.g. pressurized air or water sprays) should be avoided.
10. Any porous surfaces that are contaminated by the blood or body fluid spill should be disposed of.
11. All items used to clean the area (e.g. mop head, paper towels) and used PPE must be disposed of into dedicated clinical waste receptacle.

11.5 Sewage

Patients with suspected, probable or confirmed EVD should ideally have a dedicated ensuite toilet facility. If an ensuite toilet facility is not available, a dedicated commode should be provided and single use bedpans/urinals should be used.^{2,4,5}

11.5.1 Standard toilet

As a precautionary measure, toilet waste should be treated before it is disposed of through the sewerage system.

If using a standard toilet the patient should be instructed not to flush the toilet.

Staff using recommended PPE should add sodium hypochlorite tablets to achieve a 5000 ppm disinfectant strength (i.e. five bleach tablets = 5 x 1000 ppm).⁸ Staff should avoid adding sodium hypochlorite solution to the toilet bowl which increases the risk of splashing and aerosol generation.⁸

Sodium hypochlorite should be left to disinfect the toilet for 30 minutes. Staff need to ensure the toilet lid is down when flushing.

After the contents have been flushed, the patient toilet should be wiped over with a 1000 ppm sodium hypochlorite solution after each use.

11.5.2 Commode

Disposable pans/urinals should be used.

If using a commode disposable bed pans can be disposed of into clinical waste after the addition of high absorbency gel, if available.

Staff using recommended PPE should solidify the contents of the pan/urinal with high-absorbency granules or gel. Once the contents have solidified, both the pan/urinal and solidified contents should be placed into a biohazard bag as clinical waste.

After the contents have been removed, the dedicated commode should be wiped over with a 1000 ppm sodium hypochlorite solution after each use.

A reusable bed pan/urinal can be used and emptied into a pan sanitiser if available within the patient care area. As per above recommendations, staff should solidify the contents of the pan/urinal with high absorbency granules or gel prior to placing them in the sanitiser. Sanitisers should be run on a hypochlorite cycle or 200 millilitres of 5000 ppm sodium hypochlorite solution placed into a pan sanitiser and left for 30 minutes before emptying.⁸ This process should be confirmed with the manufacturer of the locally available pan sanitiser.

Where a patient is excreting copious amounts of unformed stool ('cholera volumes'), a bucket may need to be used as an alternative to a bed pan. The bucket should be placed under the commode or toilet chair on an absorbent mat. As there would be a high likelihood of splashes in this type of situation the nurse should wear gum boots and fluid-resistant or fluid-impermeable boot covers that extend above the gumboots. The nurse should step back from the patient if possible while they are defecating.

On completion, high absorbency granules or gel should be placed in the bucket to solidify the contents. Once the contents are solidified the bucket and contents as well as the absorbent mat should be immediately double bagged and disposed of as clinical waste.

As soon as the patient is able to be safely left or another nurse is available to relieve the nurse, the attending nurse should exit the room to remove PPE and perform hand hygiene.

As there is likely to be significant contamination of the surrounding environment in this type of situation, immediate environmental cleaning will need to be undertaken as soon as the bucket and mat is disposed of.

11.6 Waste management

All waste generated during the care of a patient with confirmed EVD should be managed as Category A infectious waste according to the Australian Dangerous Goods.¹⁴

If a patient with suspected EVD is not producing secretions while awaiting laboratory results, clinical waste (e.g. PPE, bedding) can be placed in sealed bags and handled according to the hospital's waste management policy.¹⁴

Facilities should place all EVD waste into clinical waste yellow biohazard bags. The EVD clinical waste is to be double bagged and the biohazard bags should meet the following conditions:

- have sufficient strength to safely contain the waste class it is designated to hold
- conform to the colour coding and marking system specified in Table 1
- be suitable for the purpose if used for moist heat sterilisation
- be filled to no more than two-thirds of their capacity⁹
- allow for secure final closure when the bag is filled to a maximum of two-thirds of its capacity or six kilograms, whichever is the lesser.

Staff are to ensure bags are **not** secured with closure devices that have sharp protuberances (e.g. staples).

Please refer to the Section 13. Safe injection practices for advice on sharps waste management.

The requirements for waste bags and container liners are shown in Table 1 and for the mobile clinical waste bins in Table 2.

Table 1 Waste liner requirements (excerpt from the *Environment and Heritage Protection—storage and transport of clinical or related waste information sheet*)


Type of waste	Colour of bags/containers	Colour of letters/symbol	Identification	Symbols	Transport ADG code
Clinical	YELLOW (vivid yellow Y13)	Black	Clinical waste	Biohazard symbol 	Class 6.2

Table 2 Colour designation for mobile waste bin

Types of material	Body	Lid
Clinical and related waste for incineration	Yellow	Orange
Clinical and related waste for disposal by technologies other than incineration	Yellow	Yellow

The outer yellow biohazard bag is to be wiped down with 1000 ppm available chlorine solution (staff should not use a spray bottle to wet the bags).

The biohazard bag should be kept in the patient's room before being double bagged (with the second biohazard bag) at the door of the patient room. Care must be taken when placing a bag containing waste into an empty second biohazard bag so the contents are not spilled and staff do not come in contact with the waste. Care should also be taken to not create aerosols (e.g. staff should be instructed not to compress the clinical waste bag to expel air). A trained observer must be used for this procedure.⁸

The double bagged clinical waste bag is to be disposed of in a clearly labelled dedicated 240-or 660-litre lined clinical waste container (usually a wheelie bin) located within close proximity to the patient's room. The liner is to be rated to 200 micrometres. Some contractors may require the double bagged EVD clinical waste be placed in a hard walled sealable container or a third biohazard bag before being placed in the 240- or 660-litre receptacle for transporting. The clinical waste container for transporting the waste must be rigid-walled with hard, unbending sides. It must be resistant to leakage, splitting, breaking, puncturing and erosion.

Where the Hospital and Health Service decides to re-use the transport containers used for EVD waste, the containers should be inspected after each use to ensure they are clean, intact and without leaks.

Any containers found to be defective should be repaired before use or be taken out of service. The containers must have smooth impervious interiors to contain any spillage and be able to be easily inspected, cleaned and sanitised. The containers should be colour coded as specified in Table 2.

11.6.1 Internal movement of clinical and related waste

Internal movement is the movement of secured clinical or related waste in its rigid-walled, puncture-resistant clinical waste bin from its source to the storage, collection and treatment.

Good waste management practice involves minimising exposure to the waste. To facilitate this, all movement of waste throughout the premises should be planned to avoid peak activity times such as visiting hours, meal times and change of shifts. Trolleys and bins should not be overfilled to avoid potential spillage.

11.7 Storage

Wherever possible and where appropriate, dedicated and clearly labelled clinical waste bins containing EVD related waste should immediately be removed by the contracted clinical waste provider.

The key consideration in the storage of clinical and related wastes is to ensure it is contained in a vermin-proof, clean and tidy area. Specific storage requirements should be in place for a wide range of waste generators, both large and small, and for treatment and disposal facilities. Accordingly, storage requirements will depend on the volume and type of clinical and related wastes to be contained. Measures should be taken to prevent obnoxious odours or nuisance.

Access to the storage should be limited and restricted to key personnel. Clean-up or spill kits should be available on-site.

11.8 Inactivation of Ebola virus disease waste

EVD waste may be inactivated by two methods:

11.8.1 Incineration (preferred method)

EVD-associated waste may be incinerated. The incinerator must be able to consistently maintain minimum combustion temperatures of 850°C. The resulting ash residue must be less than five per cent of the original waste volume.¹¹

11.8.2 Autoclaving

Autoclaves for the treatment of Ebola virus–contaminated wastes should be dedicated to the treatment of biohazardous wastes (i.e. not used for sterilising reusable devices) and validated for that purpose.

- Contents need to be autoclaved for a minimum of 60 minutes at 121°C and 15 pound per square inch, with slow exhaust.
- The autoclave log should document the contents, duration, time, pressure and temperature for the autoclave cycle.
- The chemical indicator strip should be examined and it should be documented that it performed to specifications to provide initial indication of a successful run.
- If the chemical indicator fails, then the sterilisation should be repeated with a fresh indicator.
- The bag should be labelled with the date and time of the run that corresponds with the biological indicator ampoule, autoclave log and chemical indicator for that run.
- The labelled autoclaved waste should be held until the biological ampoule indicates successful sterilisation.

Note: The biological indicator must be incubated according to manufacturer's directions for 48 hours to confirm effectiveness of the autoclave to inactivate organisms.

- AFTER the biological indicator confirmation, it should be documented that the bags associated with that run are ready for storage and disposal as Category B Regulated Medical Waste.¹⁰

Medical waste rendered safe by steam sterilisation, incineration or high-level chemical disinfection (e.g. with strong hypochlorite solution) is not regarded as dangerous goods or bound by the ADG Code, and so can be disposed of as general rubbish.¹⁴

11.9 Off-site transportation

Transporting waste from a generating premise to a storage, treatment or disposal facility away from the premises is off-site transportation.

Unless clinical waste containing Ebola virus is decontaminated on-site (e.g. sterilised in an autoclave, incinerated or otherwise rendered non-infectious), clinical waste must comply with Australian Dangerous Goods (ADG) regulations on packaging and transportation. Clinical waste containing Ebola virus is classified Class 6.2 Category A and must be packaged to UN 2814. However an exemption from these requirements has been granted for Category A waste intended for road transport in Queensland from 25

August 2015 until 25 August 2017. Conditions outlined in the exemption notice must be adhered to.

Hospital and Health Service facilities are responsible for ensuring the safe disposal of any clinical waste generated at the facility. Facilities should consult with their waste contractor and review clinical waste collection, transportation, treatment and disposal procedures and processes for the management of EVD waste.

12. Linen management

Disposable linen is the first choice for use with suspected, probable or confirmed EVD cases. These include patient clothing, sheets, pillowcases, blankets, towels and face washers.³

Recommended PPE must be worn when handling linen used for suspected, probable or confirmed cases with EVD.

All non-soiled linen from a suspected, probable or confirmed EVD case should be placed into a dissolvable, alginate bag. Any soiled linen should be placed in a plastic leak-proof biohazard bag. Until diagnostic tests are available, staff should store these used linen bags within a dedicated area of the patient care environment.

If EVD is excluded, the linen should be handled as per usual linen handling procedures.

If EVD is confirmed, all linen is to be discarded as clinical waste.¹⁴

13. Safe injection practices

The use of sharp devices exposes healthcare workers to the risk of injury and to blood-borne infectious agents, therefore facilities should limit the use of phlebotomy, procedures and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care.²

All needles and sharps should be handled with extreme care and disposed of in puncture-proof, sealed disposable containers.

If the use of sharp objects cannot be avoided, the following precautions need to be observed:

- Medical devices that incorporate safety engineered protection mechanisms should be used where available and practical:
 - safety syringes
 - retractable cannula
 - needless IV giving sets
 - blood collection units
 - safety lancets for blood glucose measurements.
- Staff must never recap a used needle.
- Staff must never direct the point of the used needle towards any part of the body.
- If necessary to remove the sharp, staff must use a sharps removal system (e.g. scalpel blade removers).

- Staff must dispose of all sharps in a sharps disposal system that conforms to Australian Standards (AS4031).
- The person who has used the single-use sharp must be responsible for its immediate safe disposal.

For more information on pathology specimen collection and testing, refer to the Pathology Queensland's [Suspected ebola virus infection—Pathology management plan](#) which is available on Queensland Health's intranet site only.

14. Duration of infection control precautions

If a sample is collected from a patient at the very early stages of illness and returns a negative result on EVD PCR, then, in the absence of an alternative diagnosis through other testing, and in conjunction with continued or worsening illness, a follow-up PCR at least three days after developing symptoms is advisable. Re-testing remains a clinical decision based on the patient's ongoing condition.

The need for ongoing isolation and use of transmission-based precautions in the case of a recovering patient should be determined on a case-by-case basis. An expert advisory group should be convened to make this determination. The patient should at least have two Ebola virus negative PCR tests taken a minimum of 48 hours apart.¹⁶ Factors that should be considered include, but are not limited to:

- presence of symptoms related to EVD
- date symptoms resolved
- other conditions that would require specific precautions (e.g. tuberculosis, *Clostridium difficile*)
- available laboratory information.²

Convalescent patients must be meticulous about personal hygiene due to the possibility of the presence of virus in all bodily fluids for an unknown period of time. Ebola virus has been found in the semen of some men who have recovered from Ebola infection. It is possible that Ebola could be transmitted through sex. Until more information is known, avoid contact with semen from a male survivor. Male survivors should be advised that if they have sex (oral, vaginal, or anal sex), a condom should be used correctly and consistently every time.¹²

15. Care of the deceased

Transmission of Ebola virus from deceased victims has occurred frequently in Africa, as the virus can be found in high concentrations in blood, many body secretions and tissues. The virus is usually at its highest levels in people with progressive severe illness and at death. The virus may survive for several days in the body, and on surfaces contaminated with blood or other body fluids.¹⁴

Some general precautions for handling patients who have died from EVD include the following:

- Autopsies should be avoided. An autopsy should only be done if directed by the coroner and following discussion with the public health unit.

- Only HCWs trained in handling infected human remains and wearing appropriate PPE should touch or move the body of any person who has died from EVD.
- Handling of human remains should be kept to a minimum.
- Precautions for handling a person who has died from EVD are the same as those required for contact with living patients. An apron should be worn over the PPE because of the increased likelihood of significant contamination with blood or other body fluids..
- The number of staff involved in handling, or in the same room as, the body should be kept to a minimum.
- The body should be properly prepared at the site of death. It should only be moved after this has been completed, and the outer surface of the body bag or other outer covering has been decontaminated.¹⁴

For more information on care of the deceased, including the process for placing the deceased in body bags, refer to Section 6 of the *Infection prevention and control principles and recommendations for Ebola virus disease: including information about personal protective equipment for clinical care of patients with suspected or confirmed Ebola virus disease in the Australian healthcare setting* available at:

<http://www.health.gov.au>

16. Monitoring and management of potentially exposed personnel

Healthcare workers with percutaneous or mucocutaneous exposure to blood, body fluids, secretions or excretions from a patient with suspected, probable or confirmed EVD should immediately and safely stop any current tasks, leave the patient care area and safely remove PPE.

Immediately after leaving the patient care area, wash the affected skin surfaces or the percutaneous injury site with soap and water. Irrigate mucous membranes with copious amount of water or an eyewash solution.

Immediately report the incident and follow the processes as outlined in the Queensland Health's [Guideline for the management of occupational exposure to blood and body fluids](#) available at www.health.qld.gov.au.

The exposed person should have an immediate consultation with an infectious diseases physician. Counselling should also be made available as needed (e.g. employee assistance program).

The exposed person will be asked to stay in voluntary home restriction for 21 days after the exposure and to monitor their temperature twice daily and report these to the facilities designated person daily or immediately if they become unwell or febrile (temperature greater than or equal to 37.5°C).

For more information on monitoring and management of potentially exposed personnel, refer to the *Interim guidelines for Ebola virus disease voluntary home restriction* available at www.health.qld.gov.au/ebola and the *Interim guidelines for healthcare workers caring*

for *Ebola virus disease patients in Queensland* which is available only on Queensland Health's intranet site.

17. Monitoring, management and training of visitors

Facilities should establish procedures for monitoring, managing and training visitors, ensuring that wherever possible, visitors are excluded from entering the EVD patient's room. Exceptions to this recommendation may be considered on a case-by-case basis for those who are essential to the patient's wellbeing (e.g. in the case of a child). If a visit from someone other than immediate healthcare staff is required, for any reason, they must be trained and supervised during the visit in the correct use and safe removal of the same PPE as used by healthcare staff.¹⁴

It is recommended that visitor movement within the facility is restricted to the patient care area and an immediately adjacent waiting area.

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Business area contact

Communicable Diseases Branch

Approval and implementation

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1.0	20/11/2014	SHECC EVD IMT	New document
2.0	02/09/2015	CDIM	Addition/changes to sections: 4, 5, 8, 11, 14, 15

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